

**Application Notice:**

**1. Storage Conditions**

To maintain the solderability of terminal electrodes:

- (1) Temperature and humidity conditions should be less than 40°C and 70% RH.
- (2) Recommended ceramic chip inductors should be used within 6 months from the time of delivery.
- (3) The packaging material should be kept where no chlorine or sulfur exists in the air.

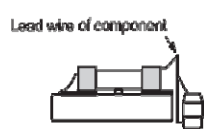

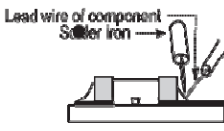
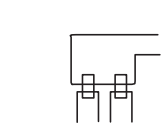
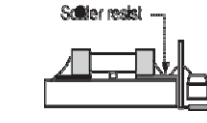
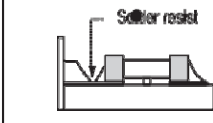
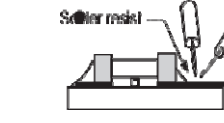
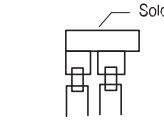
**2. Handling**

- (1) The use of tweezers or vacuum pick-ups is strongly recommended for individual components.
- (2) Bulk handling should ensure that abrasion and mechanical shock are minimized.
- (3) Chip multilayer ceramic inductors should be handled with care to avoid damage or contamination from perspiration and skin oils.

**3. Design of Land Pattern ( Land Pattern)**

Component pads should be designed to achieve good solder filets and minimal component movement during reflow soldering. Pad designs are given below for the most common sizes of multilayer ceramic inductors for both wave and reflow soldering. The basis of these designs is:

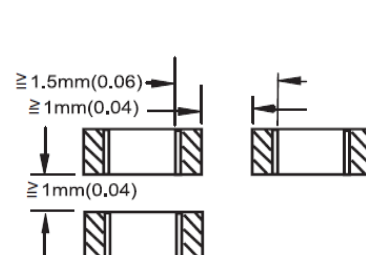
- (1) Pad width is equal to component width. It is permissible to decrease this to as low as 85% of component the width but it is not advisable to go below this.
- (2) Pad overlap is 0.5mm beneath component.
- (3) Pad extension is 0.5mm beyond components for reflow and 1.0mm for wave soldering
- (4) The following are examples of good and bad solder applications.

Items	Mixed mounting of SMD and leaded components	Components placement close to the chassis	Hand-soldering of leaded components near mounted components	Horizontal components placement
Bad				
Good				

(5) Components Spacing

For wave soldering; the components must be spaced sufficiently far apart to avoid bridging or shadowing (inability of solder to penetrate properly into small spaces).

This is less important for reflow soldering but sufficient space must be allowed to enable rework should it be required.



**4. Preheat**

It is important to avoid the possibility of thermal shock during soldering and carefully controlled Preheat is therefore required. The rate of preheat should not exceed 4°C /second and a target figure 2°C /second is recommended. Although an 80°C to 120°C temperature differential is preferred, recent developments allow a temperature differential between the component surface and the soldering temperature of 150°C (Maximum) for the components of 1210 size and below with a maximum thickness of 1.25mm. The user is cautioned that the risk of thermal shock increases as chip size or temperature differential increases.

**5. Solderability**

Terminations should be well soldered after immersion in a Sn(96.5)/Ag(3.5) tin/lead solder bath at 260 ± 5°C for 5 ± 1 seconds.

**6. Selection of Flux**

Since the flux may have a significant effect on the performance of component, it is necessary to verify the following conditions prior to use;

- (1) The Flux used should be less than or equal to 0.1 wt% (equivalent to chlorine) of halogenated content. Flux having a strong acidity content should not be applied.
- (2) When soldering a component on the board, the amount of flux applied should be controlled at the optimum level.
- (3) When using a water-soluble flux, special care should be taken to properly clean the boards.

**7. Soldering**

Mildly activated rosin fluxes are preferred. The minimum amount of solder to provide a good joint should be used. Excessive solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. 3L terminations are suitable for all wave and reflow soldering systems. If hand soldering cannot be avoided the preferred technique is the utilization of hot air soldering tools.

**8. Soldering**

- (1) Solder Reflow: Recommended temperature profiles for reflow soldering are shown in Figure 1.
- (2) Solder Wave: Wave soldering is perhaps the most rigorous of surface mount soldering processes due to the steep rise in temperature seen by the circuit when immersed in the molten solder wave, typically at 240°C . Wave soldering of ceramic chip inductors larger than 1812 size is discouraged due to the risk of thermal damage to the inductor. The recommended temperature profile for wave soldering is shown in Figure 2.
- (3) Soldering Iron: A Ceramic inductor attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed; the following precautions are recommended as shown in Figure 3.
  - Preheat circuit and inductor to 150°C.
  - Never contact the ceramic with the iron tip.
  - Use a 20 watt soldering iron with tip diameter of 1.0mm.
  - Use 280°C tip temperature (max) • 1.0 mm tip diameter (max).

